

Tables of pollen cross-reactivities for formulating allergen immunotherapy

General Patterns of Allergenic Cross-Reactivity		
Botany taxonomic ranks: kingdom>phylum>class>order>family>subfamily>tribe>genus>species		
Same tribe or genus	Closely-related compositions and protein structures	Strong cross-reactions
Same family or subfamily	Similar compositions with different/unique structures	Moderate cross-reactions
Different subfamilies or families	Distinct compositions/structures, minimal similarities	Low/no cross-reactions

Weeds					
Family		Genus	Common name and species	Notes	
Asteraceae		<i>Artemisia</i>	Mugwort (<i>A. vulgaris</i>)* Common/giant sagebrush (<i>A. tridentata</i>)* Wormwood	<ul style="list-style-type: none">Cross-react within genusMay evaluate and treat with one member; use mugwort in Europe and eastern US, sagebrush in midwestern and western US	
		<i>Ambrosia</i>	Short ragweed (<i>A. artemisiifolia</i>)* Giant ragweed (<i>A. trifida</i>)* False ragweed (<i>A. acanthicarpa</i>)* Western ragweed (<i>A. psilostachya</i>)*	<ul style="list-style-type: none">Cross-react within genusMay treat with one member, but common to treat with both short and giant ragweeds due to possible unique major/minor allergens	Ambrosia, Xanthium, and Iva in same family and may cross-react; some authors recommend using limited number of allergens from cross-reactive groups
			Southern ragweed Slender ragweed	Do not cross-react well with other ragweeds, consider treating separately	
		<i>Iva</i>	Burweed marshelder (<i>I. xanthifolia</i>)* Rough marshelder (<i>I. ciliata</i>) Poverty weed	Cross-react within genus, choose one (usually burweed marshelder)	
		<i>Xanthium</i>	Cocklebur (<i>X. communis</i>)*	Consider treating separately	
Amaranthaceae		<i>Atriplex</i> ("saltbush")	Redroot pigweed (<i>A. retroflexus</i>)* Pigweed Amaranth	Cross-react within genus, choose one (usually redroot pigweed)	
		<i>Amaranthus</i>	Wingscale (<i>A. canescens</i>)*	Cross-react within genus, choose one (usually wingscale)	
	Chenopodioidae subfamily (formerly known as Chenopodiaceae family)	<i>Salsola</i>	Russian thistle (<i>S. pestifer</i> = <i>S. kali</i>)*	May possess unique allergens, treat separately	
<i>Kochia</i>		Burning bush (<i>K. scoparia</i>)*	May possess unique allergens, treat separately		
<i>Chenopodium</i>		Lamb's quarters (<i>C. album</i>) Mexican tea	<ul style="list-style-type: none">Cross-react within genusLamb's quarter has strong cross-reactivity with <i>Salsola</i> (e.g. Russian thistle) and <i>Kochia</i> (e.g. burning bush) spp		
Urticaceae		<i>Urtica</i>	Nettle (<i>U. dioica</i>)*	Nettle and pellitory with unique allergens, treat separately	
		<i>Parietaria</i>	Pellitory (<i>P. judaica</i>)*		
Plantaginaceae		<i>Plantago</i>	English plantain (<i>P. lanceolata</i>)	Treat separately	
Polygonaceae		<i>Rumex</i>	Sheep's sorrel (<i>R. acetosella</i>) Dock	Cross-react within genus	

Grasses		
Family	Common name and genus/species	Notes
Pooideae	Timothy (<i>Phleum pratense</i>)* Sweet vernal Meadow fescue Rye June Kentucky blue Orchard Red top Velvet Canary Cereal grains (e.g. wheat, rye, barley)	<ul style="list-style-type: none"> Cross-react within family Timothy and sweet vernal may have unique allergens Treat with one member (usually timothy) but consider addition of sweet vernal if needed
Chloridoideae	Bermuda (<i>Cynodon dactylis</i>)* Lovegrass Prairie grasses including salt, buffalo, grama	Cross-react within family, choose one (usually bermuda)
Panicoideae	Johnson (<i>Sorghum halepense</i>)* Bahia Corn Sugarcane	<ul style="list-style-type: none"> Cross-react within family Evaluate bahia and johnson separately May treat with one member (usually johnson) but consider treating bahia and johnson separately

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Trees			
Family and subfamily		Common name and genus/species	Notes
Cupressaceae		Mountain cedar (<i>Juniperus ashe</i>)* Other juniper, cedar trees Cypress	<ul style="list-style-type: none"> Cross-react within family (except Taxodioideae) May evaluate and treat with one member, usually mountain cedar
	Taxodioideae	Japanese red cedar (<i>Cryptomeria japonica</i>)*	<ul style="list-style-type: none"> Not a true cedar; evaluate and treat separately from other Cupressaceae Japanese red cedar is the only species in this genus
Pinaceae		White pine (<i>Pinus strobus</i>)* Other pine trees Spruce	Cross-react within family, choose one (usually white pine)
Fabaceae		Mimosa Locust Mesquite	Cross-react within family
Betulaceae		Silver birch (<i>Betula verrucosa</i>)* European alder (<i>Alnus glutinosa</i>)* Hazelnut Hornbeam	<ul style="list-style-type: none"> Cross-react within family, and between Betulaceae/Fagaceae families The use of one locally prevalent member adequate (usually birch, alder, or oak)
Fagaceae		White oak (<i>Quercus alba</i>)* Red oak Beech Chestnut	
Juglandaceae	<i>Carya</i>	Pecan (<i>C. illinoensis</i>) Hickory	Cross-react within family
	<i>Juglans</i>	Black walnut (<i>J. nigra</i>)	
Oleaceae		Ash (<i>Fraxinus excelsior</i>)* European olive (<i>Olea europaea</i>)* Privet Lilac	Cross-react within family, choose one locally prevalent member (usually ash in N. America)
Salicaceae	<i>Populus</i>	Eastern cottonwood Poplar Aspen	<ul style="list-style-type: none"> Cross-react within genus and family, cottonwood and willow in particular
	<i>Salix</i>	Willow	
Sapindaceae	<i>Acer</i>	Red maple (<i>A. rubrum</i>)*	<ul style="list-style-type: none"> Cross-react within genus but box elder may have unique allergens, evaluate and treat box elder separately
		Box elder (<i>A. negundo</i>)*	
Ulmaceae	<i>Ulmus</i>	American elm Chinese elm Siberian elm	Cross-react within genus
Moraceae		White mulberry (<i>Morus alba</i>) Paper mulberry (<i>Morus papyrifera</i>)	Cross-react within genus
Platanaceae		American sycamore (<i>Platanus occidentalis</i>)	Cross-react within genus
Altingiaceae		American sweetgum (<i>Liquidambar styraciflua</i>)	Cross-react within genus

Arthropods		
Genus	Common name and species	Notes
<i>Dermatophagoides</i>	Dust mite (<i>D. pteronyssinus</i> , <i>D. farinae</i>)	Cross-react but also have significant unique allergens, if treating with both decrease dose of each
<i>Blattella</i>	German cockroach (<i>B. germanica</i>)	<ul style="list-style-type: none"> Unique allergens, treat with both at full dose Although, German cockroaches are most likely to occur in American homes, an equal mixture of German and American is appropriate
<i>Periplaneta</i>	American cockroach (<i>P. americana</i>)	
<i>Aedes</i>	Mosquito (<i>A. aegyptii</i>)	Treat separately

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References

Weber RW, Guidelines for using pollen cross-reactivity in formulating allergen immunotherapy, JACI, 7/2008
Cox et al, Allergen immunotherapy: A practice parameter third update, JACI, 1/2011
Weber RW, Patterns of pollen cross-allergenicity, JACI, 8/2003
Weber RW, Cross-reactivity of Plant and Animal Allergens, Clin Rev in All and Imm, 2001
Esch RE, Portnoy J, Allergen Immunotherapy, Curr All Asthma Reports, 2001

Allergen Cross-Reactivity

Allergen groups (species within the genus) listed below show strong cross-reactivity within the associated group. Using one member of the group for the allergy immunotherapy extract may be adequate to protect the patient against the entire group.

Weeds: <i>(Ambrosia)</i> Short ragweed Giant ragweed False ragweed Western ragweed <i>(Artemisia)</i> Sages Wormwood Mugworts Chenopod and Amaranth families <i>(Salsola)</i> Russian thistle <i>(Chenopodium)</i> Lambs quarter <i>(Kochia)</i> Burning bush <i>(Amaranthus)</i> Pigweed Red root pigweed Amaranth <i>(Atriplex)</i> Saltbush Wingscale Dust Mites: <i>D. pteronyssinus</i> <i>D. farinae</i>		<p>Southern and Slender ragweed do not cross-react as well as other ragweed species.</p> <p>Strong cross-reactivity between <i>Artemisia</i> species</p> <p>Skin testing suggests strong pollen cross-reactivity across chenopod and amaranth family boundaries. Predominant weed species in geographic region should be used.</p> <p>Strong cross-reactivity between <i>Atriplex</i> species</p> <p><i>D. pteronyssinus</i> and <i>D. farinae</i> have allergens with extensive interspecific cross-reacting epitopes as well as unique allergens. Generally, considered individually, dosage modifications may be made if used in combination to account for this cross-reactivity</p>
Grasses: Subfamily Festucoideae, Meadow fescue Timothy Rye Kentucky blue Orchard Red top Trees: <i>(Cupressaceae)</i> Juniper Cedar Cypress <i>(Betulaceae)</i> Birch Alder Hazel Hornbeam Hophornbeam <i>(Fagaceae)</i> Beech Oak Chestnut <i>(Oleaceae)</i> Ash European olive Privet <i>(Populus)</i> Cottonwood Poplar Aspen Cockroach: German cockroach American cockroach		<p>Strong cross-reactivity between members of the Festucoideae subfamily but unique allergenicity of Eragrostoideae (Bermuda) & Panicoideae subfamilies (Bahia & Johnson)</p> <p><i>Cupressaceae</i> family: strong evidence for cross-reactivity between members of this family. One member of this family should be adequate.</p> <p>Betulaceae and Fagales families have extensive cross-reactivity. The use of one of the locally prevalent members should be adequate.</p> <p>Oleacea family: Strong cross-reactivity between the Fraxinus (ash) and Olea (olive) species</p> <p>Although, German cockroaches are most likely to occur in American homes, an equal mixture of German and American cockroach is appropriate</p>